What do we know about industrial dynamics: a focus on innovation, competition and growth - Introduction

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Introduction : What do we know about industrial dynamics ?

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Today, industrial dynamics is considered as one of the most promising fields of research. Various reasons can explain this focus of interest. Firstly, innovation as an economic phenomenon that transforms industries in an endogenous manner is at the core of industrial dynamics approaches, and is at the same time one of the key challenge for a growing part of the scientific community. Secondly, opportunities to capture and measure regularities in the processes of evolution of industries have developed on the basis of an increasing ability to work on long term series and analyse complex systems. Thirdly, models of industrial dynamics allow for the existence of heterogeneity in the characteristics of firms within an industry (size, entry/exit, performance, geographical location, evolution of share prices), which is also largely supported by empirical evidence. Fourthly, new conclusions are drawn from industrial dynamics approaches – especially in how firms compete and how competition should operate – that are often in sharp contrast with basic results in conventional industrial organization.

Traditionally, industrial dynamics covered the study of different variables characterizing industries (such as entry/exit, penetration rate, innovation rate, R&D expenses, number of patents), and their comparison from one period to a subsequent one. Though these initial developments in industrial dynamics could bring some elements on the quantitative functioning of industries into the analysis, it is now largely recognized that these early contributions often neglected the genuine determinants that drives the evolution of innovative industries. The renewal of interest for industrial dynamics that is observed since the late 1990s goes together with a new definition of the domain: industrial dynamics lies in the study of how activities within an industry are distributed amongst firms ; industrial dynamics also analyses why and how some firms cover a wide range of activities while others are much more specialized ; industrial dynamics also includes the study of the changing degree of vertical integration among firms, and its impact on the profile of evolution of the industry. Industrial dynamics not only describes and analyses how the industry is organized now, but also how it differs from what it was in earlier periods: what forces were operative in bringing about this reorganization of the industry and how these forces have been changing over time. The study of industrial dynamics demands a permanent and sound connection between facts and theories. The stimulus provided by the patterns, puzzles and anomalies revealed by systematic data gathering and careful collection of detailed information is essential to make progress in the understanding of the forces which determine the dynamics of the industry. Methods of analyses have also greatly evolved and favoured these new orientations. Researchers now tend to collect a large spectrum of data (quantitative and qualitative) in order to determine, in a first step, major stylized facts and regularities of evolution, and to elaborate, in a second step, a comprehensive analysis of how innovative industries evolve and contribute to economic change.

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The major attempt of this special issue is to give an overview of what we know today about industrial dynamics, what are the main outcomes and challenges that come to the surface in this new field. The special issue will thus be aimed at characterizing advances in industrial dynamics, as well as key limits, and also new domains to be explored.

The special issue starts with the paper by Franco Malerba who characterizes the major progresses that have been made, and the way in which the research agenda has evolved recently. His contribution is driven by the idea that though two distinct traditions have initially emerged – one centred on firms, entry, survival and growth; the other on institutions and knowledge – a progressive convergence starts taking place (if not yet engaged). This convergence is possible, but also attractive since it reinforces the specificities of industrial dynamics in articulating systematically theoretical advances and empirical results.

Advances in industrial dynamics are thus numerous. The most robust one is certainly that many industrial sectors have a life cycle, meaning that they are sequentially engaged in a phase of emergence, growth, maturity, decline and death. But limits also exist, and are thus discussed in the special issue. Guido Buenstorf and Ulrich Witt argue that the usual result in industry life cycle literature that older and larger firms (the first movers) displace younger and smaller firms is not necessarily achieved. As soon as firms' growth issues are taken into account, and thus that the traditional technological focus of industry life cycle is complemented by organisational problems, then it is possible to conceive that new entrants perform better than entrants by diversification, and even that incumbents exit prematurely the industry while latecomers survive. Thomas Grebel, Jackie Krafft and Paolo Saviotti advocate that basic results on the industry life cycle are all relative to industries that appeared during the first half of the 20th century and are thus now mature. New phenomena have emerged since then, and greatly shape the profile of evolution of modern industries which are often termed as knowledge-intensive. Among these new phenomena are the survival of incumbents, the regular entry of new firms, and finally their co-existence within networks of innovation. Evidence drawn from telecommunications and biotechnologies suggests that industry life cycle models should be modified to account for these new phenomena. David Audretsch and William Baldwin also consider these knowledge intensive industries as the core of their paper. They review how public policies and especially competition policy in the US have been inflected over time, reflecting also a change in the economic models of reference. In the early days of the 20th century, industrial organisation models based on the interaction of the traditional factors of production (labour and capital) were dominant, while today, new industrial dynamics models based on how the creation of knowledge contributes to economic growth constitute the key reference. Mario Amendola, Jean-Luc Gaffard and Patrick Musso investigate a related topic, the one of the interaction between innovation, productivity gains and the evolution of the market structure. They show that the success of innovation does not primarily depend on the properties of technology. Rather, innovation generates productivity gains only if, after the breaking up of the current market structure, a certain level of stability is restored, necessary to the coordination of activities within and among firms. The special issue is finally dedicated to stress that industrial dynamics has certainly developed so well because of its openness to new questions, and its capacity to relate unconnected, yet complementary fields of research. Steven Klepper investigates the determinants of the geographic structure of new industries, making thus the link between industrial dynamics and economic geography. Based on empirical investigations into the television, automobile, and tyre industries, he discusses the agglomeration effect, often advocated in the literature. This agglomeration effect does not apply in these industries which are characterized either by a concentration of firms in areas where production was initially negligible, or by a progressive dispersion of firms

leaving formerly highly concentrated areas. An hypothesis based on the ideas of organisational birth and heredity is finally privileged in the explanation. Mariana Mazzucato finally explores the possible link between industrial dynamics and financial dynamics. Her argument, not often documented in the literature despite an increasing empirical support, is that stock price volatility is fundamentally linked to the real (not imaginary) structure of technological change during industry evolution. In fact, in major industries of the old and new economy, growth rates and stock prices were the most volatile the same decades in which innovation was the most radical, with new competences created and older ones destroyed.

Finally, I would like to close this introduction by reminding that the title of the special issue is inspired by a famous article « What do we know about entry? » published in 1995 in the *International Journal of Industrial Dynamics*, and written by the late Professor Geroski. As anyone knows, Professor Geroski was one of the most leading scholar in the field. He always expressed his views on the development of the research agenda in industrial dynamics with the highest clarity. He died by August 28, 2005.